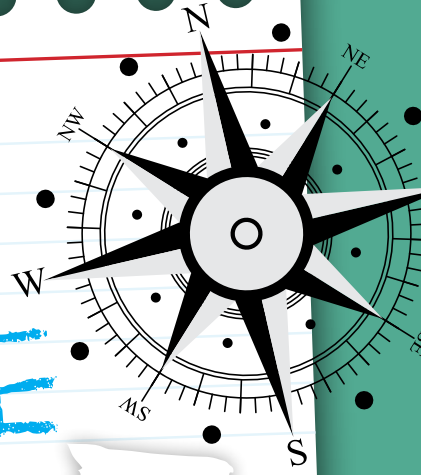


STARDOME OBSERVATORY & PLANETARIUM FACTS, RESOURCES AND ACTIVITIES ON...

FINDING NORTH IN THE DAY TIME



To find your way (not be lost) you need to know where you are and where you need to get. Maps show us where we are, and the directions North, South, East and West tell us where to go. These are called the cardinal points, and maps usually are oriented with north at the top. In the day time, the position of the Sun can be used to find your direction.

The Sun is due north at solar noon, which is exactly between sunrise and sunset on any given day. The Sun's shadow will therefore, point south at solar noon.

See our 'Rising and Setting of the Sun' resource and activity discovering the cycle of where the Sun rises and sets during the year.

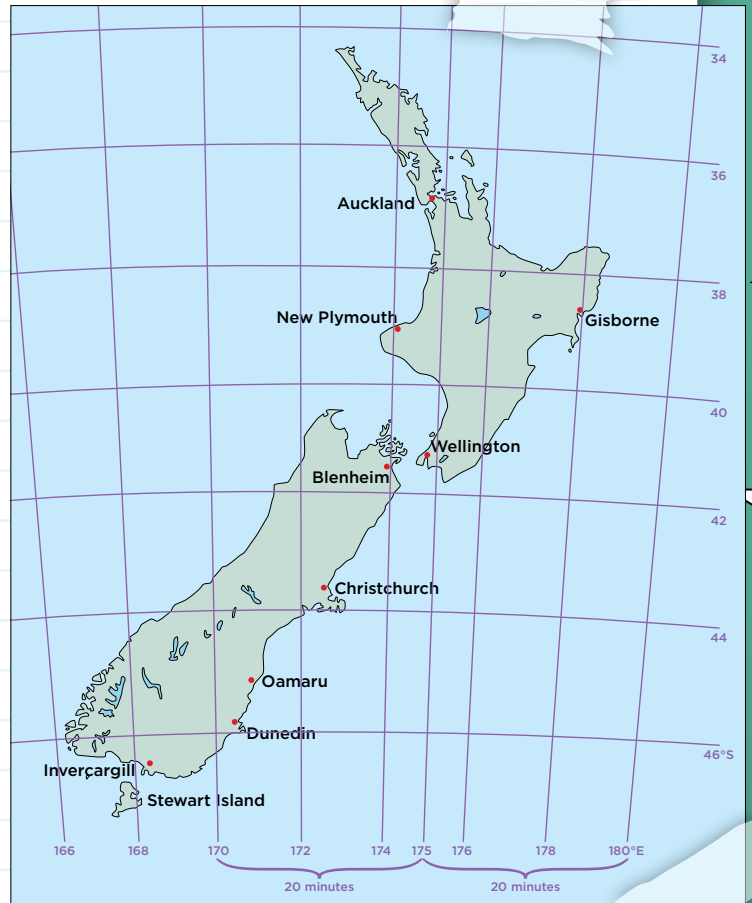
Solar noon is not the same as plain 'noon' or 'midday', which is 12 o'clock according to your clock or watch. The time we use daily is called 'Civil Time' and is based on 'mean solar time'.

The length of the day varies by about 15 minutes before and after noon during the year. This is because Earth speeds up and slows down during its elliptical orbit around the Sun - solar noon in Auckland is at 1:35 in February, 12:17 in May, 12:27 in July and 1:05 in October/November!

To avoid dealing with the changing lengths of the hour, civil time divides an 'average' day into 24 equal hours - a 'mean solar day'.

Civil time also groups locations together by longitude, so in New Zealand we are in a Time Zone that is exactly 12 hours ahead of Greenwich in London.

However, because no part of New Zealand is 180° from London, no part is actually 12 hours ahead. For instance, Auckland is just 174.7° east of Greenwich (Invercargill is 168.3°). This means Auckland has about 20 minutes of 'daylight saving' built in.



Check out these other resources...

☞ Sunrise and sunset times in New Zealand - NZ Astronomical Yearbook:
<http://stardome.org.nz/astronomy/resources/sun-rise-times/>

DISCUSSION POINTS

**SCIENCE CONTENT/
CURRICULUM LINK**
TELLING TIME AND DIRECTION DURING THE DAY. SHARING IDEAS AND OBSERVATIONS ABOUT TIME AND THE SUN.

Why does the height of the Sun at noon change during the year?

The Sun rises due east and sets due west only twice a year - when?

Which direction is the Sun at noon in the northern hemisphere?

Spacecraft don't use the Sun to find their way around the Solar System because it's too big and bright!

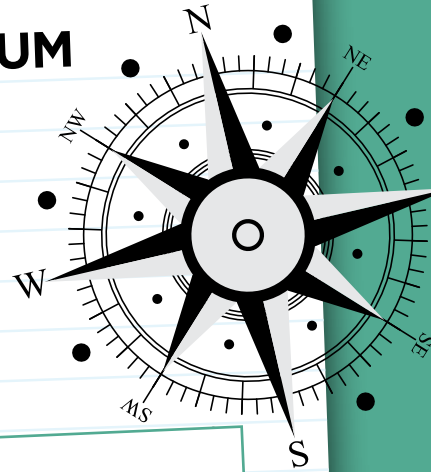
THE EARTH SPINS 5° EVERY 20 MINUTES.



ACTIVITY

STARDOME OBSERVATORY & PLANETARIUM

FINDING NORTH USING THE SUN



ACTIVITY ONE

Task One

FIND THE TIME OF LOCAL SOLAR NOON

Step 1. Look up the times of sunrise and sunset for your location on the day of your observation. These are available from newspapers, web sites (e.g. www.timeanddate.com) and the *NZ Astronomical Yearbook*.

Step 2. Calculate in hours and minutes (not decimals) using 12-hour clock time:

- amount of sunlight = (12 noon) - (sunrise time) + (sunset time)
- time of solar noon = (amount of sunlight) ÷ 2 + (sunrise time)

Example:

Wellington 15th April: sunrise 6:50am; sunset 5:50pm

- $12 - 6:50 = 5:10 + 5:50 = 11:00$ hours [length of sunlight that day]
- $11:00 \div 2 = 5:30 + 6:50 = 12:20$ pm [time of local noon]

Task Two

USE THE SUN'S SHADOW TO FIND NORTH

Using the calculated time of local solar noon in Task 1, mark the Sun's shadow from a vertical stick, goal post or corner of a building. On flat ground it will point directly south. North is in the opposite direction.

ACTIVITY TWO

USE AN ANALOGUE WATCH OR PORTABLE CLOCK TO FIND NORTH USING THE SUN.

Step 1. Hold your watch (or portable clock) horizontally.

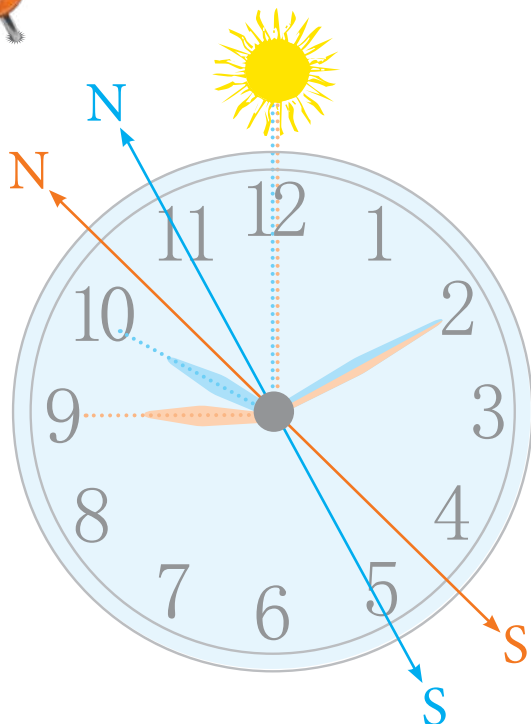
Step 2. Orient the watch so the 12 o'clock mark faces the Sun. For greater accuracy, hold a toothpick, match or small twig upright at the centre of the watch so its shadow lines up with the 6 o'clock mark.

Step 3. An imaginary line from half way between the 12 o'clock mark and the hour hand will point north. Continuing this line through the opposite side of the dial will point south.

Step 4. If it is Daylight Saving Time, subtract an hour from the position of the clock's hour hand before finding the half way point.

This can also be done with a digital watch by drawing a representation of an analogue clock on paper and following the steps as for an actual analogue timepiece.

← The **blue** lines represent summer time and the **orange** lines represent Daylight Saving Time.



Take a photo of your activity and send it to us. We'd love to see it! education@stardome.org.nz

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